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REMARKS

This communication is in response to the Office Action mailed on May 11, 2005 and a telephone conference on September 8, 2005. In the Office Action, claims 1-33 were pending of which all were rejected.

The Office Action reports that claims 1-33 were provisionally rejected under the judicially created doctrine of obvious-type double patenting as being unpatentable over claims 1-44 of copending Application No. 09/823,619 in view of U.S. Patent No. 5,828,991 to Skiena et al. (hereinafter Skiena) and U.S. Patent 6,415,248 to Bangalore et al. (hereinafter Bangalore)

It is noted that both the present application and co-pending application no. 09/823,619 were commonly owned at the time of the invention and have the same filing date of March 31, 2001. Therefore, it is respectfully submitted that a terminal disclaimer is not necessary because the present application could not extend the right to exclude as referred to in the Office Action. Thus, it is respectfully requested that the double patenting rejection be redrawn.

The Office Action next reports that claims 1-3, 5-9, 11 and 12 were rejected under 35 U.S.C. §102 (b) as being anticipated by U.S. Patent 6,018,736 to Gilai et al. (hereinafter Gilai)

Claim 1 has been amended to recite a method for spell checking an intended word entered using a reduced keypad, where each of one or more input keys of the reduced keypad is mapped to a plurality of letters, the method comprising: for an entered key input corresponding to an entered word and at least one of a left context and a right context, finding one or more potential non-corresponding words from a dictionary of words based on a cost, where each potential non-corresponding word has a key input that does not match the key input of the entered word, and wherein the cost between the key input of the entered word and the non-corresponding potential word is less than or equal to a maximum

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cost; and determining a probability for the one or more potential non-corresponding words based on the at least one of a left context and a right context using a language model trained in part using words entered in a cache; and presenting at least one of the one or more potential non-corresponding words as the intended word based on probability.

As discussed in the telephone interview, claim 1 has been amended to clarify that probability is determined for each potential non-corresponding word based on at least one of a left and right context. Such probabilities are stored in a language model trained in part using words entered in a cache. Thus, the language model is not fixed but rather is trained in part on words that are entered into a cache by a user.

Claim 3 further defines the method of claim 1. Claim 3 includes determining a list of potential words corresponding to the key input for the entered word and determining a probability for each listed word based on left and/or right context using the language model, and ranking both the corresponding words and the non-corresponding words based on probability. Thus, a system in accordance with claim 3 can present more than one type of word to the user as a potential word. One word type includes potential words having the same or corresponding key entry due to the ambiguous nature of a reduced keyboard. Another word type are non-corresponding words, which are words having key inputs that do not match the key input of the entered word. The non-corresponding key input can be due at least to a correct key input for a misspelled word or an incorrect key input for a correctly spelled word. [See Specification, page 25, lines 4-7]

In contrast, Gilai discloses a database accessing system that includes a similar word finder operative that can find similar words to an interpretation of a word entered by the user. [abstract] Gilai discloses similarity scores to select potential words due to possible erroneous user entries. (See FIG.

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5) It is believed that Gilai, however, does not include determining a probability for the potential words based on at least one of a left context and a right context using a language model trained in part using words entered in a cache as recited in claim 1.

Instead, it is believed that the Gilai probabilities or frequencies are associated with the database. Thus, the user in Gilai is limited to entering text associated with databases. In the present inventions, a user can enter any text in a particular language. The language model of the present inventions is constructed using at least a training corpus from a natural language. Words entered into the cache are also used in determining probabilities.

It is observed that Gilai discloses trigram stochastic FSA 78 on FIG. 1. "Trigram" is a word often associated with language models. However, as discussed in the interview, it is believed that Gilai is referring to character trigrams such as "aba" or "abe", not word trigrams as in the present inventions. For illustration, Gilai provides automaton 78 stores all trigrams appearing in the dictionary. Also, Gilai provides that spell guess unit 30 uses these stored trigrams to anticipate probable spelling of any given ambiguous string. [Col. 10, lines 29-36] Thus, it is believed that Gilai does not teach or suggest calculating probabilities based on a left and/or right context (e.g. such as with an n-gram based language model) as recited in claim 1 and described in the specification.

In light of the foregoing, it is believed that claim 1 is patentable over cited art. Claims 2-14 depend on claim 1 and are believed to be separately patentable. Reconsideration and allowance of claims 1-14 are respectfully requested.

The Office Action next reports that claims 4 and 13 were rejected based on 35 U.S.C. §103 as unpatentable over the combination of Gilai in view of U.S. Patent No. 6,556,841 to Yu

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(hereinafter Yu). Yu discloses a method of spelling correction for two-way communication devices. As noted above, claims 4 and 13 depend on presently amended claim 1. It is respectfully submitted that the combination of Gilai and Yu does not teach or suggest all the features of claim 1 such as determining probability based on a left and/or right context using a language model as recited in claim 1. It is further believed that claims 4 and 13 are patentable based on the scope of claim 1. Thus, it is respectfully requested that this rejection be withdrawn.

The Office Action reports that claim 10 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Gilai in view of U.S. Patent No. 5,610,812 to Schabes et al. (hereinafter Schabes) Schabes discloses a contextual tagger utilizing a deterministic finite state transducer. As discussed above, claim 1 on which claim 10 has been amended. It is also believed that the combination of Gilai and Schabes does not teach or suggest all the features of claim 1. Thus, it is respectfully requested that this rejection be withdrawn.

The Office Action next reports that claims 14-27, 29, and 31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gilai et al. in view of U.S. Patent No. 5,828,991 to Skiena et al. (hereinafter Skiena). Claim 14 has been amended to recite in part, A computer-readable medium having instructions stored thereon for execution by a processor to perform a method for determining a word entered using a reduced keypad, where each of one or more input keys of the reduced keypad is mapped to a plurality of letters, the method comprising: receiving key input corresponding to the word and a left context; for each word in a vocabulary that is consistent with the key input of the word, determining a probability of the word given the left context using a language model trained in part on words entered into a cache, and adding the word and the probability of the word to an array of word-probability pairs; finding one or more potential

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words from a dictionary of words, where each potential word has a cost between the entered key input of the word and an input sequence corresponding to the potential word less than or equal to a maximum cost; determining a probability of each potential word given the left context and taking into account a probability that each letter of the potential word is misspelled, and adding the potential word and the probability of the word to the array; determining the intended word corresponding to the key input as a word of a word-probability pair within the array of word-probability pairs having a greatest probability. [emphasis added]

Claim 14 clarifies that the probability of a word having key input corresponding the entered word is determined based on the left context word or words surrounding the entered word. Such a probability is stored in a language model that is trained or retrained using words entered into the cache. It is believed that the believed that the combination of Gilai and Skeina do not teach or suggest all of the features of claim 1.

Remarks relating to Gilai discussed mostly with respect to claim 1 are incorporated herein. Skiena discloses a system and method of reconstructing sentences entered using a reduced keyboard such as a telephone keypad using word ambiguity resolution. It is believed that the Skiena system and method requires that the entire sentence be entered first with symbols placed between words in order segment individual words. (See FIGS. 3 and 7) A word trellis or lattice is constructed with possible words or tokens corresponding to each entered word. (abstract) Paths through the lattice represent possible sentence reconstructions. (abstract) A Viterbi algorithm is used to decode or select paths based on probability. (Col. 9, lines 9-11)

Importantly, it is believed that Skiena discloses that implausible sentences can be rejected by augmenting each possible word with a tag. The tag represents a grammatical word category. (FIG. 8, Col. 9, line 64 to Col. 10, line 2) It is believed that

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bigram frequencies for the tags are collected to derive transitional probabilities for the tags for the Viterbi algorithm to consider. (Col. 10, lines 12-19) The tags can be used to ensure that implausible sentences are rejected (Col. 9, line 67), not to select words based on probability.

Thus, it is believed that Skiena does not include a language model that is trained using words entered into a cache as recited in claim 1. Instead, it is believed that Skiena's word and word pair frequencies are determined for the entire language using a fixed corpus. (abstract) For example, Skiena is believed to disclose the Brown corpus as one possible corpus. (Col. 6, lines 46-49)

In contrast, in the present inventions in accordance with claim 14, the language model is initially trained based on a larger corpus. However, the language model can be improved by further training based on words entered into the cache. It is believed that using words in the cache to improve the language model is advantageous due to, for example, a particular user's propensity to enter and/or misspell certain words more frequently than typical for a particular language. Such a propensity can be included in the language model for greater accuracy, including spell-checking accuracy, for a particular user.

In light of the foregoing, it is respectfully submitted that claim 14 is patentable over the cited art. Claims 15-23 depend on claim 14 and are believed to be separately patentable. Reconsideration and allowance of claims 15-23 are respectfully requested.

The Office Action reports that claim 24 was rejected in a similar basis as claim 1. Claim 24 has been amended in a manner similar to claims 1 and 14 and recites an apparatus comprising: a plurality of keys, each of one or more of the keys mapped to a plurality of letters, the plurality of keys used to enter key input corresponding to a word and at least one of a left context

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and a right context; a word-determining logic comprising: an ambiguity resolving logic comprising a module adapted to generate a list of words, each listed word having a key input sequence identical with the key input sequence of the entered word; a second module adapted to determine a probability of each listed word based in part on the at least one of the left context and the right context using a language model trained in part with words previously entered into a cache; and a spell-checking logic designed to provide potential alternative words for the entered word corresponding to the key input entered, where the entered word is misspelled, taking into account that the word was entered using the plurality of keys, as opposed to a keyboard having a unique key for each of a plurality of letters. [emphasis added]

The above remarks are herein incorporated by reference. Claim 24 clarifies that the word-determining logic comprises both an ambiguity resolving logic and a spell-checking logic. The ambiguity resolving logic comprises and least two modules, where the second module is adapted to determine probabilities of possible words that have the same key input sequence as the entered word. These probabilities are determined based on the left and/or right logic using a language model that is constructed and/or trained using words previously entered into the cache by the user.

In light of the foregoing remarks it is believed that claim 24 is patentable over the cited art. Claims 25-33 depend on claim 24 and are believed to be separately patentable. Reconsideration and allowance of claims 24-33 are respectfully requested.

During the telephone interview, the examiner and the undersigned discussed possible amendments to claim 1 to further clarify the present inventions versus the prior art. The examiner, in particular, opined that words having similar meaning such as "Catherine" and "Kathryn" as described in Gilai could be construed as similar but "non-corresponding" words. The examiner

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then suggested further amending claim 1 to clarify what is meant by "non-corresponding" words. In response, claim 1 has been amended to recite "where each potential non-corresponding word has a key input that does not match the key input of the entered word". It is noted that the examiner and undersigned further discussed defining "cost" as recited in claim 1. However, it is believed that further defining cost was discussed as an alternative to further defining non-corresponding words as discussed above. Therefore, in the present amendment, "cost" has not been further defined in claim 1.

A petition for a one-month extension of time is hereby requested. A charge authorization form is included herewith for the extension fee.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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